

Worksheet 10.2 B

(1) (a) $\bar{x} = 105.758$ $s = 13.868$ $n = 33$ $df = 32$

(b) State:	Check:
1) SRS	1) stated
2) $pop \geq 10n$	2) there are more than 330 7th graders in the district
3) $n \geq 30$	3) $n = 33 \geq 30$

(c) $105.758 \pm (2.449)(13.868\sqrt{33}) = (99.847, 111.67)$

We are 98% confident that the average IQ score for 7th graders at the Midwest School district is between 99.846 and 111.67 points.

(d) conditions- checked above

$H_0: \mu = 100$

$H_a: \mu \neq 100$

$$t = \frac{105.758 - 100}{13.868/\sqrt{33}} = 2.385$$

$$2 * P(t > 2.385) = 0.023 \quad \alpha = 0.03$$

We reject H_0 b/c p-value of $0.023 < \alpha = 0.03$.

We have sufficient evidence that the average IQ score for the 7th graders at Midwest School District is not 100 points.

2) page 514 #54

(a) $H_0: \mu = 18$
 $H_a: \mu < 18$

(b) $H_0: \mu = 2.6$
 $H_a: \mu \neq 2.6$

3) $n = 45$ $\bar{x} = 4.62$ $s = 0.92$ $df = 44$

(a)	State	Check
	1- SRS	1- stated
	2- $n > 30$	2- $n = 45 > 30$
	3- $pop > 10n$	3- there are more than 450 locations

(b) $4.62 \pm (2.015)(0.92\sqrt{45}) = (4.3436, 4.8964)$

We are 95% confident that the true average contamination in the stream is between 4.3436 & 4.8964 milligrams

(c) $H_0: \mu = 5$
 $H_a: \mu < 5$

$$t = \frac{4.62 - 5}{0.92/\sqrt{45}} = -2.771$$

$$P(t < -2.771) = 0.004$$

We reject H_0 b/c p-value of $0.004 < \alpha = 0.05$.
We have sufficient evidence that the true average contamination level is less than 5 milligrams.

4) (45.6, 59.3) 94% confidence

(a) 98% confidence --> wider interval (44, 61)

(b) 91% confidence --> narrower interval (47, 58)

5) 95% confidence (32.9, 48.4)

(a) $\bar{x} = 40.65$ units

(b) $m = 7.75$ units

(c) increase confidence to 99%

margin of error increases, conf int gets wider

(d) increase sample size

margin of error gets smaller, conf int gets narrower

6) #57 on page 515 $n = 269$ $\bar{x} = 137$ $s = 65$

State	Check
1- SRS	1- stated
2- $n > 30$	2- $n = 269 > 30$
3- $\text{pop} > 10n$	3- there are more than 2690 1st year college students

$H_0: \mu = 150$ $df = 268$
 $H_a: \mu < 150$

$$t = \frac{137 - 150}{65/\sqrt{269}} = -3.280 \quad P(t < -3.280) = 5.873 \times 10^{-4}$$

We reject H_0 b/c $p\text{-value} < \alpha = 0.05$.

We have sufficient evidence that the true average study time of first year students is less than 150 minutes.

7) Complete #46 on page 509 in the textbook. Check conditions (you can assume that the population is normally distributed, so the sample size being less than 30 is ok) & then create and interpret a 95% confidence interval.

Conditions:

- | | |
|-----------------------|---|
| 1) SRS | 1) |
| 2) $n > 30$ | 2) population is normal, so sample size is ok |
| 3) $\text{pop} > 10n$ | 3) |

8) $p = 0.52$ $\hat{p} = 51/115 = 0.443$ $n = 115$

State	Check
1- SRS	1- stated
2- $n > 30$	2- $n = 115 > 30$
3- $\text{pop} > 10n$	3- there are more than 1150 ice cream store patrons

$H_0: p = 0.52$
 $H_a: p < 0.52$

$$Z = \frac{0.443 - 0.52}{\sqrt{\frac{(0.52)(0.48)}{115}}} = -1.643$$

$P(Z < -1.643) = 0.0502$

$\alpha = 0.05$

We fail to reject H_0 b/c $p\text{-value} = 0.0502 > \alpha = 0.05$

We do not have sufficient evidence that the true percent of people who say chocolate is their favorite ice cream flavor is less than 52%.